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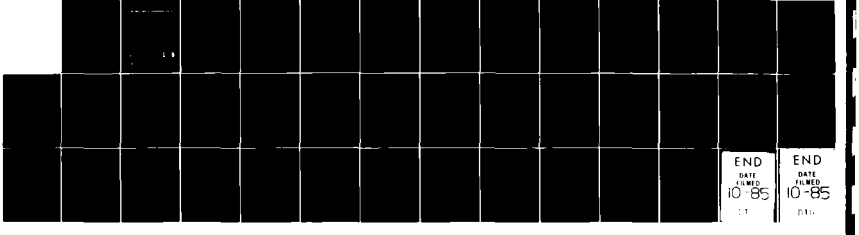

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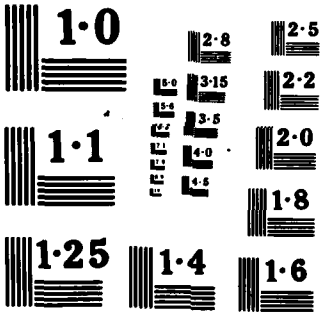
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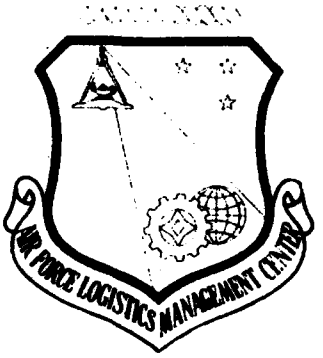


XF3 Retention Policy

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AFLMC Report LS840801

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## ABSTRACT

We conducted an analysis of the Air Force Policy for declaring base-level excesses for field-level reparable (XF3) items. Our analysis was divided into two parts: partial excess and complete excess. In this report, we present our analysis and recommended stockage policy changes as well as the estimated operational and stock fund impacts which will result from these changes. Implementation of our recommendations will result in an increase of 60,000 aircraft mission capable hours per year.

## EXECUTIVE SUMMARY

In our earlier EOQ Excess Computation Report, we evaluated Air Force base retention policy for Economic Order Quantity (EOQ) items. In this report, we evaluated base retention policy for field-level reparable (XF3) items. As a result, we recommend an alternative method of computing exceses that will increase item availability and operational capability.

We analyzed the problem as two issues: partial excess (on-hand balance exceeds a positive demand level) and complete excess (on-hand balance and no demand level). We found, at one base, that 96% of the partial excess items were needed at that same base after they had been declared excess. In addition, 36% of complete excess items had subsequent demands.

Currently, demand levels for XF3 items are computed based on at most 12 months demand experience. We found that the number of demands for XF3 is erratic. Consequently, demand levels are erratic. We therefore recommend using at least 18 months of historical demand data in order to smooth erratic demand and accurately compute levels.

We found two factors to be statistically significant for predicting an item's future demand: number of demands and the mission impact code. We found, at Randolph AFB, over 57.0% of the items without subsequent demand were mission impact code 5 and had zero demands in the two years prior to becoming excess. We recommend using specified retention periods based on the mission impact code for items. Those items with a higher mission impact code will be held for a longer period. We estimate using a longer retention period will increase aircraft mission capable hours by 60,000 annually.

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# CHAPTER 1

# THE PROBLEM

## Background

In our earlier EOQ Excess Computation Report [3], we evaluated Air Force base retention policy for Economic Order Quantity (EOQ) items. In this report, we evaluate the base retention policy for field-level reparable (XF3) items. In early 1984, Air Force Inspector General reports [4,5] documented premature disposal of reparable assets by bases.

## Problem Statement

Existing retention policy for XF3 items may cause premature disposal of assets by a base. Our specific study objectives were to:

a. Determine if existing Air Force policy accurately indicates when an XF3 item becomes excess.

b. Determine if existing Air Force policy disposes of items that will be subsequently demanded.

c. Develop a method to identify those items that will be subsequently demanded.

d. Develop stockage policy changes to allow bases to keep those items that will be subsequently demanded.

## CHAPTER 2

## ANALYSIS

We document our analysis in five segments. First, we describe our overall analysis approach. Second, we describe existing reparable stockage policy and its effect on retention. Then, we present our statistical analysis of partial excesses and complete excesses. Finally, we address implementation issues.

### ANALYSIS APPROACH

Our analysis approach to XF3 retention policy was similar to that of our EOQ (or XB3) Excess Computation study [3]. Any study of excesses requires a great deal of data accumulated over a long period of time. We had three years of semiannual item record data available on Randolph AFB and Upper Heyford AB. These two bases are part of the Air Force Supply Data Bank. They are two of six bases determined to be representative of the Air Force Supply System [1]. We conducted our analysis using three years of semiannual ("snapshot") item record data and transaction data of items coded XF3. The results of the analyses of both bases' data were similar. For brevity, we show the results of our analysis for Randolph AFB in the tables and figures in this chapter. Appendix B presents the results of our analysis for Upper Heyford AB.

As in the excess report on XB3 items, we defined an XF3 excess as **AN ITEM FOR WHICH WE HAVE NO FORESEEABLE FUTURE NEED.** With this concept in mind, we conducted statistical analyses to develop retention policy changes.

We first determined what generated the excesses at base-level by examining the excess cause identification codes found on the item record. The biggest causes of excesses were; demand level decreases (Y cause code) which accounted for 13.1% of all excesses, and demand level deletions (Z cause code) which accounted for 48.1% of all excesses. Therefore, over 61.0% of both partial and complete excesses were caused by changes to demand levels. Thus, existing policy was a major influence on identifying excesses. Appendix A shows the relative frequency of excess cause codes for both Randolph AFB and Upper Heyford AB.

We therefore divided our analysis into the two prime areas of excesses--partial and complete. For each category, we determined the excess items' characteristics and number of items with a subsequent demand. We employed statistical techniques to identify what factors relative to an item are useful in predicting future need. Then we applied those factors toward developing effective retention policy for both partial and complete excesses. However, before we begin our analysis, we describe the existing reparable stockage policy.

### REPARABLE STOCKAGE POLICY

Existing policy for reparables states an item is assigned a demand level of one if there has been only one demand in 365 days and that demand was

within 180 days of the current date. It further states that the demand level is decreased to zero when there has only been one demand in 365 days and the date of that demand is greater than 180 days. **AN ITEM CAN BE DECLARED COMPLETELY EXCESS IN AS LITTLE AS 180 DAYS WITHOUT A DEMAND.**

Existing policy considers a maximum of only 12 months demand in setting a demand level. Our examination of the demand patterns for XF3 items shows that demand is erratic over time. There can be a large number of demands in one six-month period followed by few or no demands for the subsequent six-month period. Table 2-1 shows the number of demands in each six-month period for a sample of four XF3 items.

TYPICAL DEMAND PATTERNS

| NOMENCLATURE | MAR 81 | SEP 81 | MAR 82 | SEP 82 | MAR 83 | SEP 83 |
|---|---|---|---|---|---|---|
| Dome Assembly | 3 | 9 | 9 | 8 | 3 | 0 |
| Engine Mount Assembly | 9 | 1 | 1 | 5 | 6 | 1 |
| Steering Assembly | 8 | 3 | 1 | 0 | 3 | 9 |
| Seal | 2 | 0 | 2 | 1 | 7 | 5 |

TABLE 2-1

It is apparent the number of demands experienced by an XF3 item is not constant over time. For example, the number of demands for the dome assembly in a six-month period varied widely from a high of nine in both September 1981 and March 1982 to zero in September 1983.

In Table 2-1, we showed the number of demands actually experienced. We next examined the corresponding demand levels computed based on 12 months of demand history. In Table 2-2, we present the number of demands and the demand levels computed in each six-month period for the dome assembly.

COMPARISON OF
NUMBER OF DEMANDS TO DEMAND LEVEL
DOME ASSEMBLY

| | SEP 81 | MAR 82 | SEP 82 | MAR 83 | SEP 83 |
|---|---|---|---|---|---|
| NUMBER OF DEMANDS | 9 | 9 | 8 | 3 | 0 |
| DEMAND LEVEL | 2 | 3 | 7 | 5 | 1 |

TABLE 2-2

Because the number of demands varied over time, demand levels were also erratic. The last demand level shown is a 1 computed based on 12 months of demand. However, it is clear from looking at the pattern of number of demands over time, the actual demand for the dome assembly is higher than the demand level of 1 indicates. By basing demand level computation on a maximum of 12 months of demand, we are causing demand levels to change more often than they should. THE AIR FORCE CURRENTLY SMOOTHS DEMAND LEVELS FOR XB3 ITEMS BUT DOES NOT SMOOTH XF3 DEMAND LEVELS.

**THE FLUCTUATION IN DEMAND LEVELS CAUSES PARTIAL EXCESSES.** For example, assuming five assets were on hand to support the demand level of 5 in March 1983; in September 1983, the demand level decreased to 1 which would cause four items to become excess even though based on the item's history, those assets will probably be needed later. **THE CURRENT POLICY APPLIED TO XF3 ITEMS DOES NOT SMOOTH THE DEMAND LEVELS TO COMPENSATE FOR THE FLUCTUATION IN THE NUMBER OF DEMANDS.**

## PARTIAL EXCESS

A partial excess usually occurs because the demand level has decreased and the on hand balance exceeds the new demand level.

### Item Characteristics

In Table 2-3 we present some characteristics of partial excess items. Based on semiannual data over three years there was an average of 28 line items partial excess at any given time.

PARTIAL EXCESS CHARACTERISTICS
(Randolph)

| Average per line item | |
|---|---|
| Number of units | 28 |
| Unit price | $600 |
| Extended cost | $16,800 |
| Total Cost All Items | $470,400 |

TABLE 2-3

Extended cost is the number of units excess times the unit price. Total cost is the average extended cost times the average number of line items. Thus, at any one point in time, the average number of line items partial excess was 28, with an average unit price of $600 and a total cost of $470,400.

For XF3 items, we are dealing with a small population of items at the base. As shown in Figure 2-1, 25% of the items cost less than $75. Over 84% of the items had a unit price of $750 or below.

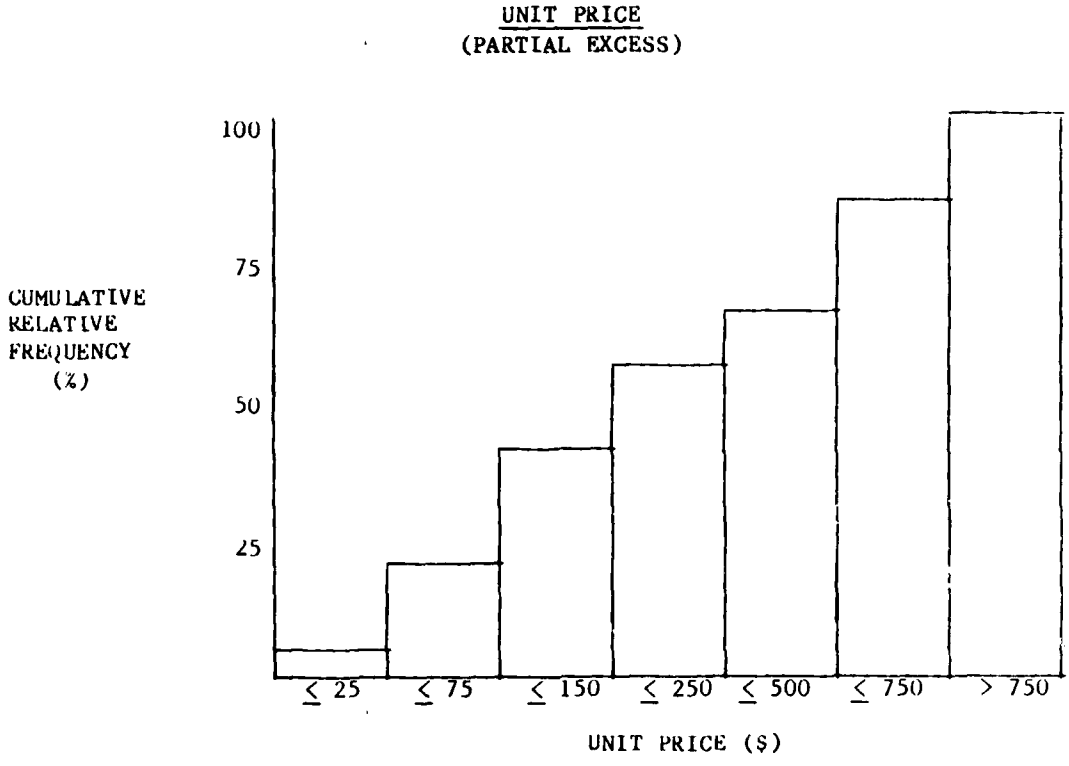


FIGURE 2-1

Extended cost (number of units excess times unit price) is shown in Figure 2-2. Over 13.0% of items had an extended cost of $100 or less; about 75% of the items had an extended cost of $3000 or less.

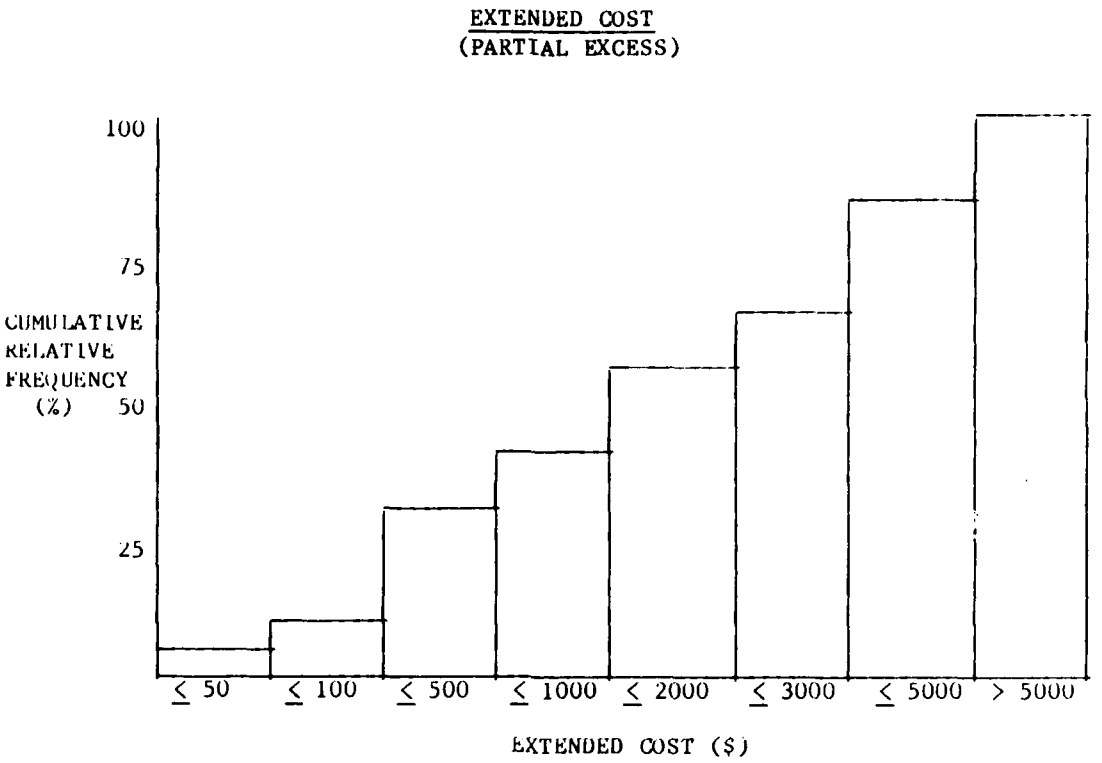


FIGURE 2-2

Retention Policy

We also found that 96% of the items declared partial excesses were in fact subsequently required within the time frame of our data set. The average time to the next demand from the time of being declared excess was 9.8 months. For the 96% of the items with subsequent demands, we checked to see if any of the amount reported excess was needed to fill the subsequent demands. In 93% of the cases, the entire excess quantity was needed to satisfy a subsequent customer request. In all cases at least some of the excess quantity was subsequently needed.

Thus, there is a high probability these items will be needed later. **THESE ITEMS SHOULD NOT BE LABELED EXCESS.** We need to smooth the demand levels to prevent these items from being declared excess. We smooth the demand levels by taking two actions: increasing the demand history and not taking action so quickly. We need to keep at least 18 months of demand data for XF3 items. This will result in a more realistic demand level. In our analysis, we used 18 months of demand data and found only 33.5% of the items currently declared excess were identified as excess. We also recommend an item not be declared partial excess until it meets the following criteria:

a. On-hand balance exceeds two year's requirement, and

b. The item has had no demand in 180 days.

## COMPLETE EXCESS

A complete excess occurs when there is an on-hand balance and no demand level. By far the greatest cause of complete excesses is the demand level deletion. Under current policy, if an item has had only one demand in a year and that demand was more than 180 days before, a complete excess is generated.

### Item Characteristics

Complete excess items at Randolph AFB had the characteristics shown in Table 2-4. There was an average of 35 line items at any given time.

COMPLETE EXCESS CHARACTERISTICS
(Randolph)

| Average per line item | |
|---|---|
| Number of units | 3 |
| Unit price | $245 |
| Extended cost | $735 |
| Total Cost All Items | $25,725 |

TABLE 2-4

At any point in time, the average number of line items excess at Randolph AFB was 35, with an average unit price of $245, and a total cost of $25,725.

Figure 2-3 shows the frequency distribution for unit price. Nearly 92% of the items cost $750 or less per unit.

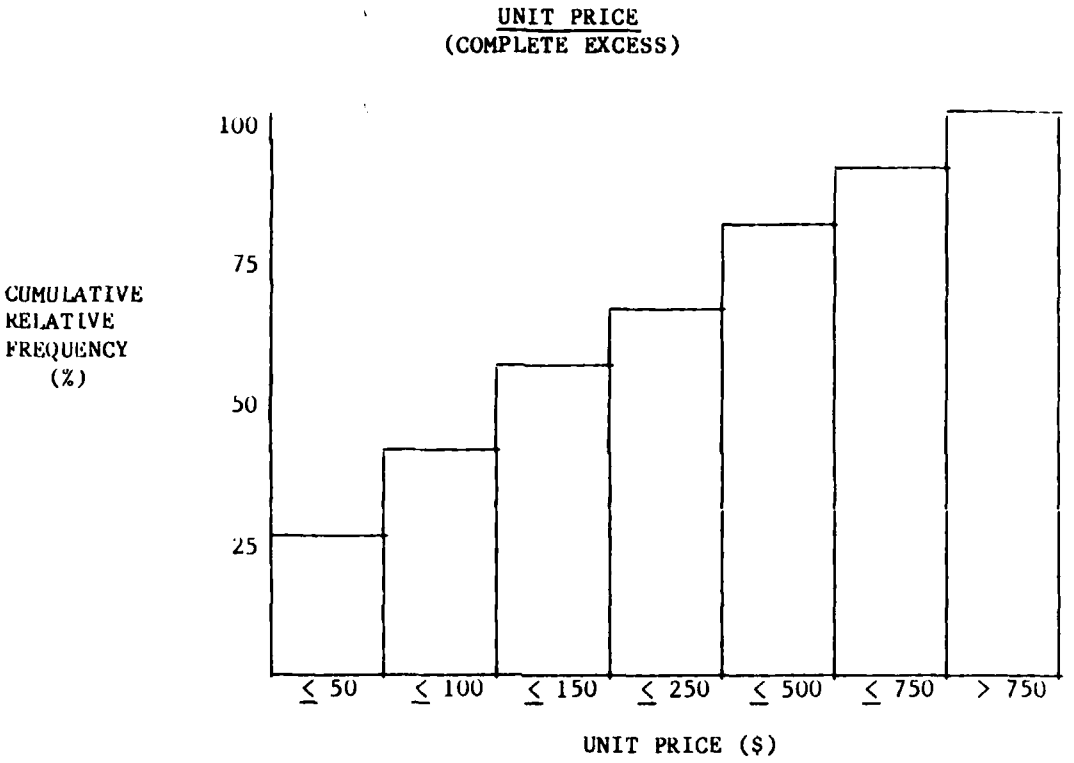


FIGURE 2-3

The frequency distribution for extended cost is presented in Figure 2-4. Extended cost (number of units excess times unit price) was less than $300 for 64.5% of the items.

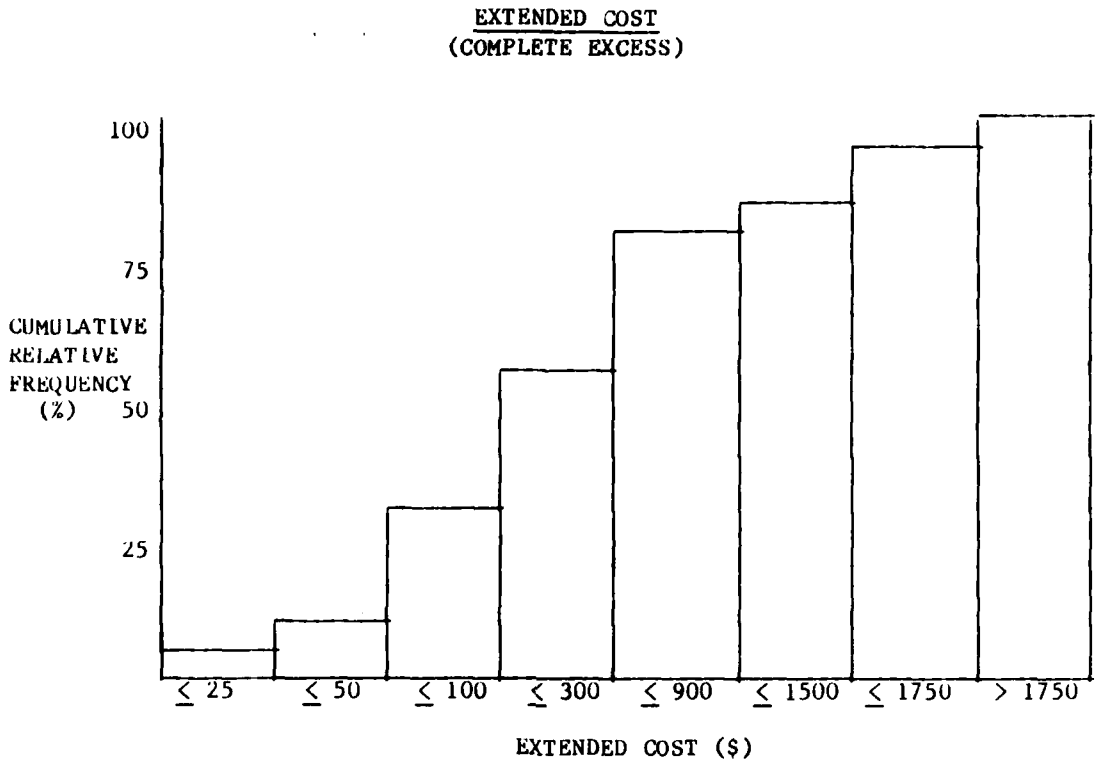


FIGURE 2-4

We found that 36% of the items had demands subsequent to being declared excess. Figure 2-5 shows the time it took to receive that demand. The average time was 8.1 months. Sixty-four percent were needed within three months. At Randolph AFB, all of the items that had a subsequent demand had that demand within 21 months.

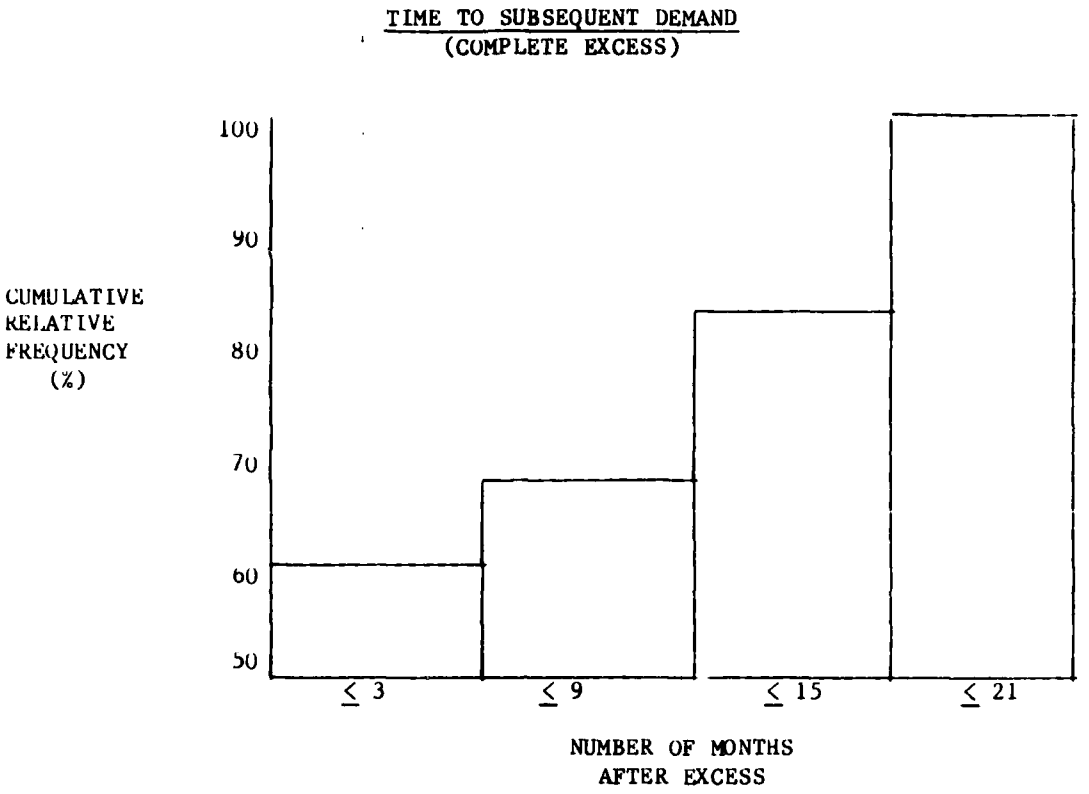


FIGURE 2-5

In many cases, the subsequent demand caused the bases to have to reprocure those same items. We therefore conducted a cost trade-off analysis for complete excess items. We examined the possible policy of holding all complete excess items versus not holding them and thus having to order and repurchase 36% of the items that had a subsequent demand. Our analysis showed a ratio of 1.3 for holding cost to order and repurchase cost. In other words, the base could have held all the complete excess items for 1.3 years at the same cost to order and repurchase the 36% of the items that had subsequent demands. However, we should determine stockage policy based on operational capability as well as economic criteria. Therefore we conducted further analyses.

Factor Analysis

We used statistical techniques to determine if there were any factors that would indicate an item declared excess would have subsequent demand. Factors proved to be without value included: the unit price, the number of units excess, the dollar value of units excess, the cause of excesses, and the Federal Supply Group (FSG) of the item.

Two factors were found to be statistically significant (99% confidence level): the mission impact code [2], which is derived from the urgency justification code (UJC) and is similar to the stockage priority code (SPC), and the number of demands. In the next section we explain how SPCs are assigned and downgraded. We also describe the mission impact code [2] we used for XF3 items.

Stockage Priority Code/Mission Impact Codes

In our analysis of XB3 excesses, we found stockage priority codes (SPCs) to be significant in predicting an item's future need. However, XF3 items do not have an SPC assigned.

Stockage Priority Code

SPCs are currently used to determine when to start and stop stocking XB3 items. They are assigned to all XB3 items. Listed below (Table 2-5) are the five codes and the associated urgency justification codes (UJC) which are used to assign an SPC when the item is backordered.

STOCKAGE PRIORITY CODES

| Code | Backorder Priority |
|---|---|
| 1 | Reportable MICAP, "1" Urgency justification code or priority awaiting parts request |
| 2 | "A" Urgency justification code or other awaiting parts request |
| 3 | "B" Urgency justification code |
| 4 | "C" Urgency justification code |
| 5 | Other |

TABLE 2-5

As indicated above, a UJC will change an item's SPC only when the item is out of stock and backordered. The SPC will not be changed upon demand if stock is on hand. Under the current system, an SPC is assigned when the item is first requested (backordered). If no subsequent demands are received, SPCs 1 through 3 are downgraded by one every 90 days. The SPC is downgraded from 4 to 5 if there are no further demands in 180 days. To illustrate, assume an "A" issue request is received, the item was backordered on Day 0 and there are no subsequent demands. On Day 0, an SPC of 2 would be assigned. After 90 days, the SPC is downgraded to 3; after another 90 days to 4, and after 180 more days the SPC is downgraded to 5. Thus, on Day 360, an SPC of 5 would be assigned.

## Mission Impact Code

To identify the essentiality of XF3 items, we used the mission impact code that we describe in [2]. To assign a mission impact code for XF3 items, we followed the same procedures as above, except we assigned the code based on the UJC of any issue request (not only backorders), and that code was never downgraded. We used three years' transaction history data and converted the UJCs into mission impact codes. We then determined the mission impact code (the highest priority) for complete excess items in the two years before being declared excess. We compared the mission impact codes of those items with subsequent demands to those without. The results are shown in Table 2-6.

MISSION IMPACT CODES OF ITEMS
WITH AND WITHOUT SUBSEQUENT DEMAND
(COMPLETE EXCESS ITEMS)

| MISSION CODE (BEFORE EXCESS) | NUMBER OF EXCESS ITEMS | NUMBER OF ITEMS WITH SUBSEQUENT DEMAND | NUMBER OF ITEMS WITHOUT SUBSEQUENT DEMAND |
|---|---|---|---|
| 1 | 8 | 7 | 1 |
| 2 | 17 | 16 | 1 |
| 3 | 1 | 0 | 1 |
| 5 | 35 | 14 | 21 |

TABLE 2-6

The mission impact code 4 is not shown in the table because there were none at Randolph AFB. Of those items with a code of 1 and 2 before being declared excess, 92% had subsequent demands.

### Number Of Demands

We counted the number of customer demands in the two-year period prior to the item being declared excess. We did this to determine if there was a statistical difference in the number of demands between an item that had subsequent demands and one that did not. Table 2-7 shows the results. The more demands in the two years prior to becoming excess, the higher the probability an item will have a subsequent demand.

AVERAGE DEMAND TWO YEARS PRIOR TO EXCESS

| | ITEMS WITH SUBSEQUENT DEMAND | ITEMS WITHOUT SUBSEQUENT DEMAND |
|---|---|---|
| Average Number of Demands | 1.1 | .7 |

TABLE 2-7

However, some of the items in the "subsequent demand group" had not been demanded in the previous two years and some in the "without subsequent demand group" had many prior demands. Therefore, if we had stopped our analysis here, we would have recommended keeping some items too long (those in the group that averaged .7 number of demands) and would not have kept some items in the group that averaged 1.1 demands.

We then put the two factors - mission impact code and number of demands - together. First, we looked at the mission impact code for those items without subsequent demands. The results are shown in Table 2-8.

MISSION IMPACT CODE FOR ITEMS WITHOUT SUBSEQUENT DEMAND (COMPLETE EXCESS ITEMS)

| CODE | NUMBER | PERCENT |
|---|---|---|
| 1 | 1 | 4.16 |
| 2 | 1 | 4.16 |
| 3 | 1 | 4.16 |
| 4 | 0 | 0.00 |
| 5 | 21 | 87.50 |

TABLE 2-8

Of the 24 items without subsequent demands, 21 were mission impact code 5. Therefore, 87.5% of the items without a subsequent demand had a mission impact code of 5 for the two years prior to being declared excess.

We then analyzed these 21 items to determine the number of previous demands in the two years prior to being declared excess. Table 2-9 illustrates this data.

NUMBER OF PREVIOUS DEMANDS FOR ITEMS WITHOUT SUBSEQUENT DEMAND
(MISSION IMPACT CODE 5)

| ND | NUMBER | PERCENT |
|---|---|---|
| 0 | 12 | 57.2 |
| 1 | 2 | 9.5 |
| 2 | 2 | 14.3 |
| 3 | 3 | 9.5 |
| 4+ | 2 | 9.5 |
| TOTAL | 21 | |

TABLE 2-9

By combining the two factors of a mission impact code 5 with zero previous demands in two years we would include 50% (12/24) of all true excess items - those which had shown no subsequent need.

We next analyzed those items with subsequent demands. For the first factor, mission impact code, the results are shown in Table 2-10.

MISSION IMPACT CODE FOR ITEMS WITH SUBSEQUENT DEMAND
(COMPLETE EXCESS ITEMS)

| CODE | NUMBER | PERCENT |
|---|---|---|
| 1 | 7 | 18.9 |
| 2 | 16 | 43.4 |
| 3 | 0 | 0.0 |
| 4 | 0 | 0.0 |
| 5 | 14 | 37.7 |
| TOTAL | 37 | |

TABLE 2-10

Of the 37 items that had a demand after being declared excess, 23 (62.3%) had mission impact codes of 1 and 2. Only 14 (37.7%) were mission impact code 5 the previous two years.

Next we looked at the number of previous demands for these mission impact code 5 items which had subsequent demands. Table 2-11 shows this data.

NUMBER OF PREVIOUS DEMANDS FOR ITEMS WITH SUBSEQUENT DEMAND
(MISSION IMPACT CODE 5)

| ND | NUMBER | PERCENT |
|---|---|---|
| 0 | 4 | 28.6 |
| 1 | 5 | 35.7 |
| 2 | 1 | 7.1 |
| 3 | 2 | 14.3 |
| 4+ | 2 | 14.3 |
| TOTAL | 14 | |

TABLE 2-11

Therefore, if previous demands are considered, an additional 71.4% (10/14) of the line items with a mission impact code 5 would be retained. These items would satisfy subsequent demands. By combining both previous demands and mission impact codes 1 through 4, the Air Force would retain 89.2% (33/37) of the items that were previously declared excess but were subsequently required.

Therefore, we combined the two factors - mission impact code and zero demands in two years - into a rule. We will hold items for specified periods based on the mission impact code and zero subsequent demand. Table 2-12 shows each mission impact code and the length of time the item will be held without subsequent demand. As you can see, items with a high mission impact code will be held longer.

MISSION IMPACT CODE
RETENTION PERIOD

| MISSION IMPACT CODE | RETENTION PERIOD WITH ZERO DEMAND |
|---|---|
| 1 | 3 years 6 months |
| 2 | 3 years 3 months |
| 3 | 3 years |
| 4 | 2 years 6 months |
| 5 | 2 years |

TABLE 2-12

## IMPLEMENTATION ISSUES

We looked at three implementation issues: the operational impact, the stock fund impact, and the method of implementation.

### Operational Impact

As a measure of operational impact, we looked at the mission impact code of the items at the next demand after being declared completely excess. Table 2-12 shows the results at Randolph AFB.

PRIORITY OF SUBSEQUENT DEMAND

| MISSION IMPACT CODE | NUMBER | PERCENT |
|---|---|---|
| 1 | 8 | 21.6 |
| 2 | 27 | 73.0 |
| 3 | 1 | 2.7 |
| 4 | 1 | 2.7 |
| 5 | 0 | 0.0 |

TABLE 2-13

Based on this data, 21.6% of the items had MICAP or high priority Awaiting Parts requirements after they had been identified as "excess." Over 70% were Priority "A" or "BR" awaiting parts requests. In other words, over 90% of the items identified as "excess" under the old system subsequently had high priority requests. Using our proposed rule, these items would have been available for issue. We estimate we would have reduced the number of XF3 MICAPs at Randolph AFB by 1% (average number of XF3 MICAPs prevented annually divided by average number of XF3 MICAPs) by using our retention rule. At Upper Heyford, the reduction was also 1%. We applied the 1% reduction to the number of Air Force-wide XF3 MICAP incidents, and determined that MICAP aircraft incidents could be reduced by 434. Thus with a longer retention period, **WE PROJECT AN INCREASE IN AIRCRAFT MISSION CAPABLE HOURS OF 60,000 ANNUALLY.**

### Stock Fund Impact

The second implementation issue is the stock fund impact. We estimated the impact of implementing our retention policy for complete excess items based on the USAF Supply Management Report. We project the change in retention criteria will cause $9.6 million in inventory to be held in a year. This inventory will stratify as valid requirements, partial and complete excess; with the majority in partial excesses. If our recommendations are completely implemented, much of the partial excesses will stratify as requirements. Appendix C provides the computational details.

Method of Implementation

We briefed the results of our analysis to HQ USAF/LEY. As a result, the Data Systems Design Office (DSDO) developed a functional description to implement our recommendations. The changes are scheduled for implementation in April 1985. In order to get these changes implemented this soon, several shortcuts were taken. These shortcuts will improve the XF3 retention policy, but THEY ARE NOT THE FINAL ANSWER. The date will be recorded when the item has had no demands in 180 days. Then, if there are no demands in 730 days from the recorded date, report the item complete excess. However, if there is a demand, then the date will be deleted. It was also decided cumulative recurring demands (CRD) must be recorded for 18 months of demand in the same manner as the EOQ cumulative recurring demands. For XF3 items, this will require two CRDs: one used to compute the demand level and one used to compute excess.

There are two problems with this method of implementation. First, the mission impact code is ignored. More effective retention rules are possible using the mission impact code. Second, there should be only one cumulative recurring demands because of the disparity between base and Air Force excess reporting as a result of using two cumulative recurring demands. Partial excesses will not be computed or reported at base level; however, the Consolidated Stratification and Transaction Report (M20) will show partial excesses.

## CHAPTER 3

## CONCLUSIONS/RECOMMENDATIONS

### Conclusions

1. Ninety-six percent of partial excess items were subsequently demanded. Of those, all subsequently needed at least some of the units declared excess.

2. The number of demands is erratic over time for XF3 items.

3. Demand levels fluctuate often and are not smoothed.

4. Thirty-six percent of the items declared complete excess were subsequently required.

5. The number of demands and the mission impact code are important factors in predicting the future need of an XF3 item.

### Recommendations

Our recommended retention policy changes were briefed to HQ USAF/LEX and LEYS and have been scheduled for implementation. This is what we recommended:

a. Consider at least 18 months of demand for computing partial excess. (OPR: HQ USAF/LEY, OCR: DSDO/LGS)

b. Report partial excess if on-hand balance exceeds two years' requirement and the item has had no demand in 180 days. (OPR: HQ USAF/LEY, OCR: DSDO/LGS)

c. Declare an item complete excess based on no subsequent demands in the following retention periods:

| Mission Impact Code | Retention Period |
|---|---|
| 1 | 3 years 6 months |
| 2 | 3 years 3 months |
| 3 | 3 years |
| 4 | 2 years 6 months |
| 5 | 2 years |

NOTE: The Data Systems Design Office's proposed alternative rule (based on zero demand in two years six months) that will be implemented is an acceptable **temporary** alternative. However our full recommendation should be implemented. (OPR: HQ USAF/LEY, OCR: DSDO/LGS)

d. Implement the mission impact code for XF3 items as presented in our EOQ Item Mission Impact Analysis [2]. (OPR: HQ USAF/LEY, OCR: DSDO/LGS)

## APPENDIX A

## EXCESS CAUSE CODE FREQUENCY

## APPENDIX A

## EXCESS CAUSE CODE FREQUENCY

### RANDOLPH AFB

| DEFINITION | CAUSE CODE | RELATIVE FREQUENCY(%) NUMBER OF ITEMS | RELATIVE FREQUENCY (%) COST |
|---|---|---|---|
| Turn-in (Maintenance) | L | 2.4 | 4.3 |
| Receipt (Not Due-In) | P | 7.1 | 1.4 |
| Inventory Adjustment | S | 2.4 | 1.6 |
| Demand Level Decrease | Y | 13.1 | 18.8 |
| Demand Level Deletion | Z | 48.1 | 32.3 |
| *Other | | 26.9 | 41.6 |

TABLE A-1

### UPPER HEYFORD AB

| DEFINITION | CAUSE CODE | RELATIVE FREQUENCY(%) NUMBER OF ITEMS | RELATIVE FREQUENCY(%) COST |
|---|---|---|---|
| Turn-in (Maintenance) | L | 1.3 | 2.0 |
| Receipt (Not Due-In) | P | 1.8 | 2.3 |
| Inventory Adjustment | S | 1.3 | .3 |
| Demand Level Decrease | Y | 9.4 | 5.8 |
| Demand Level Deletion | Z | 39.4 | 30.9 |
| *Other | | 46.8 | 58.7 |

TABLE A-2

* The Other category includes excesses due to: turn-ins by other than maintenance, special requisition receipts, price/quantity unit pack change, and deletion of special level.

# APPENDIX B

# ANALYSIS OF UPPER HEYFORD AB

## APPENDIX B

## ANALYSIS OF UPPER HEYFORD AB

This appendix summarizes the analysis, in tables and figures, for Upper Heyford AB. We used the same set of statistical analysis techniques for Upper Heyford AB as we did for Randolph AFB. The findings at the two bases were consistent.

### PARTIAL EXCESS

The characteristics of partial excesses are shown in Table B-1. There was an average of 22 line items at any given time.

PARTIAL EXCESS CHARACTERISTICS

Average per line item

| | |
|---|---|
| Number of Units | 9 |
| Unit Price | $640 |
| Extended Cost | $5,760 |
| Total Cost of All Items | $126,720 |

TABLE B-1

Ninety-four percent of the partial excess items at Upper Heyford AB had subsequent demands. Of these, 93% used the entire excess quantity.

Figure B-1 shows the relative frequency distribution for unit price. Over 52.0% of the items had a unit price of $350 or less.

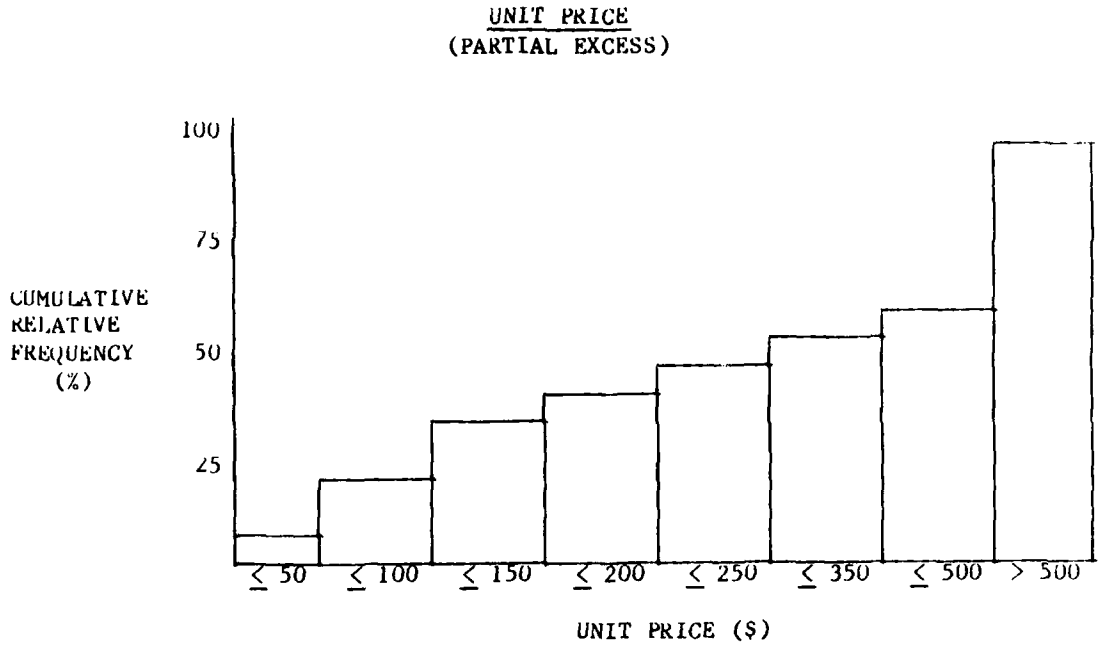


FIGURE B-1

Figure B-2 shows the relative frequency distribution for extended cost. Over 41.0% of the items had an extended cost of $900 or less.

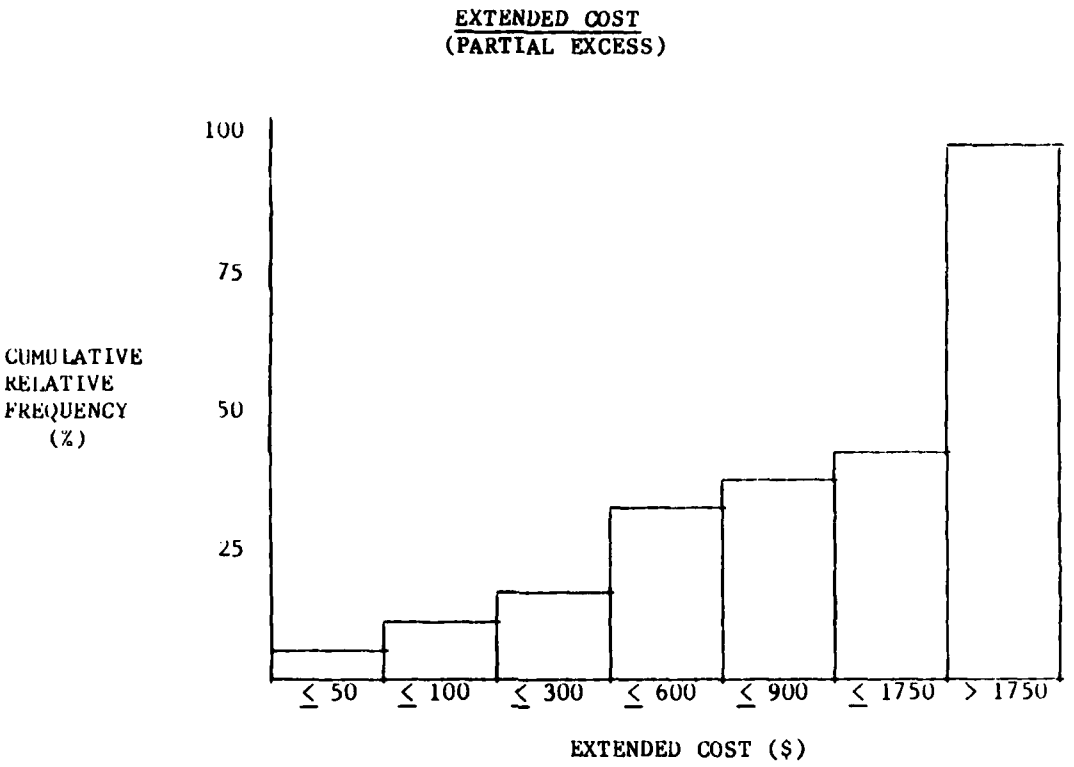


FIGURE B-2

COMPLETE EXCESS

The characteristics of complete excess items are shown in Table B-2. There was an average of 187 items at any given time.

COMPLETE EXCESS CHARACTERISTICS

| | |
|---|---|
| Average per line items | |
| Number of Units | 4 |
| Unit Price | $440 |
| Extended Cost | $1,760 |
| Total Cost of All Items | $329,120 |

TABLE B-2

Figure B-3 shows the frequency distribution for unit price. The unit price was $500 or less for 85.0% of the items.

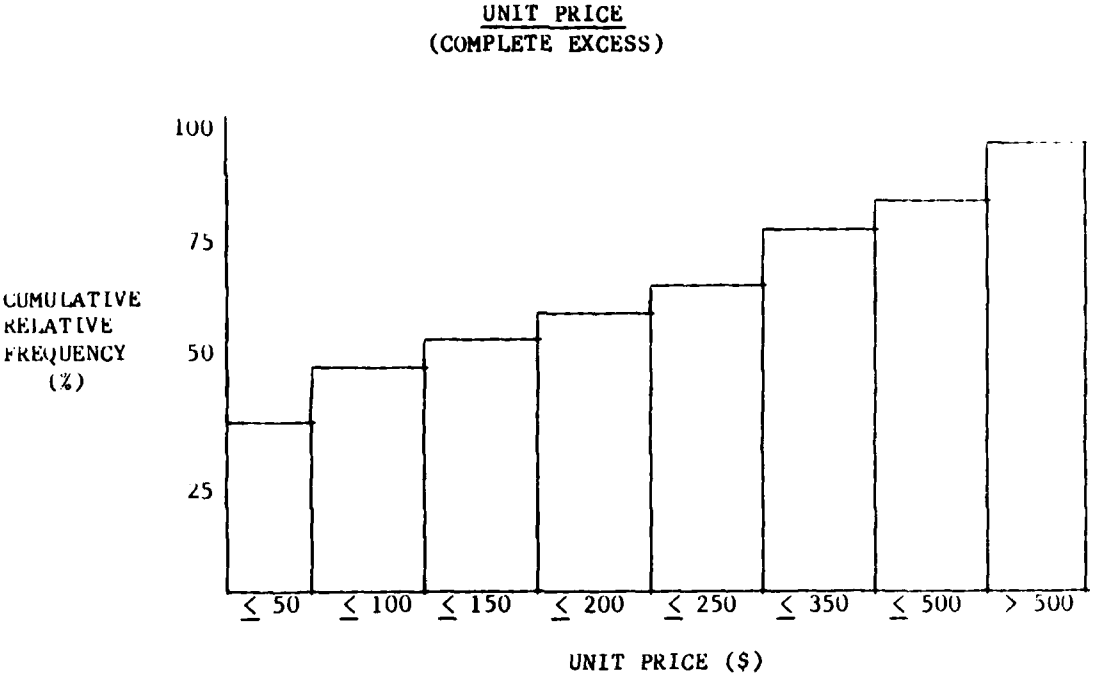


FIGURE B-3

The frequency distribution for extended cost is presented in Figure B-4. For 76.4% of the items, the extended cost was $600 or below.

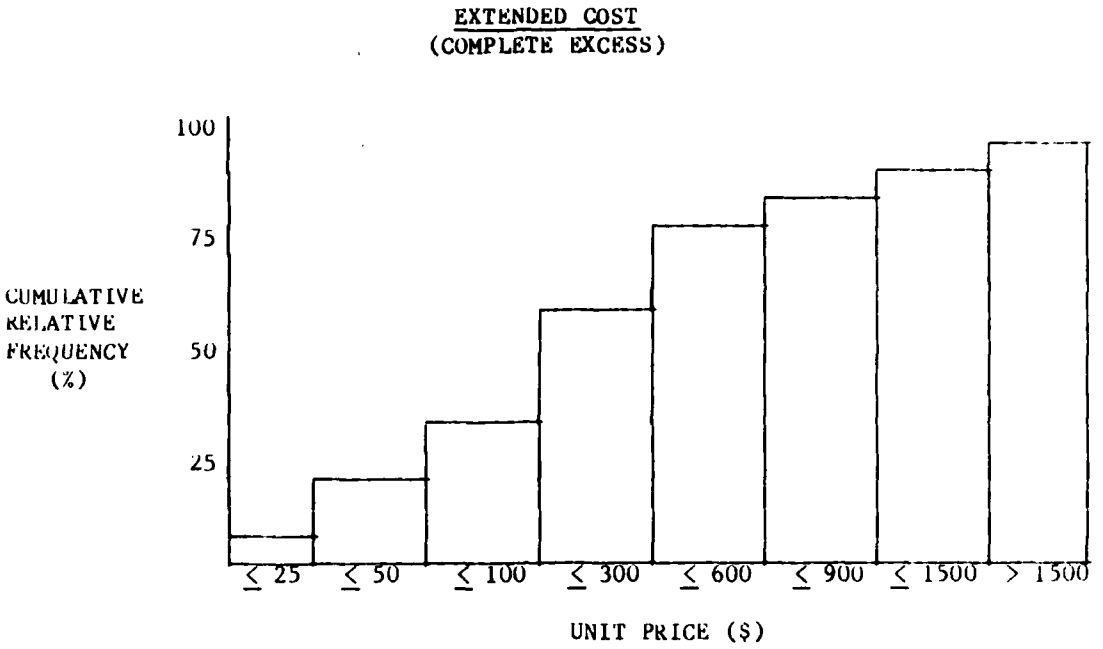


FIGURE B-4

We found that 27% of the items declared completely excess had subsequent demands in an average of 7.6 months. Figure B-5 shows the frequency distribution of subsequent demands. Of the 27% that had subsequent demands, 87.6% were within 15 months.

TIME TO SUBSEQUENT DEMAND
(COMPLETE EXCESS)

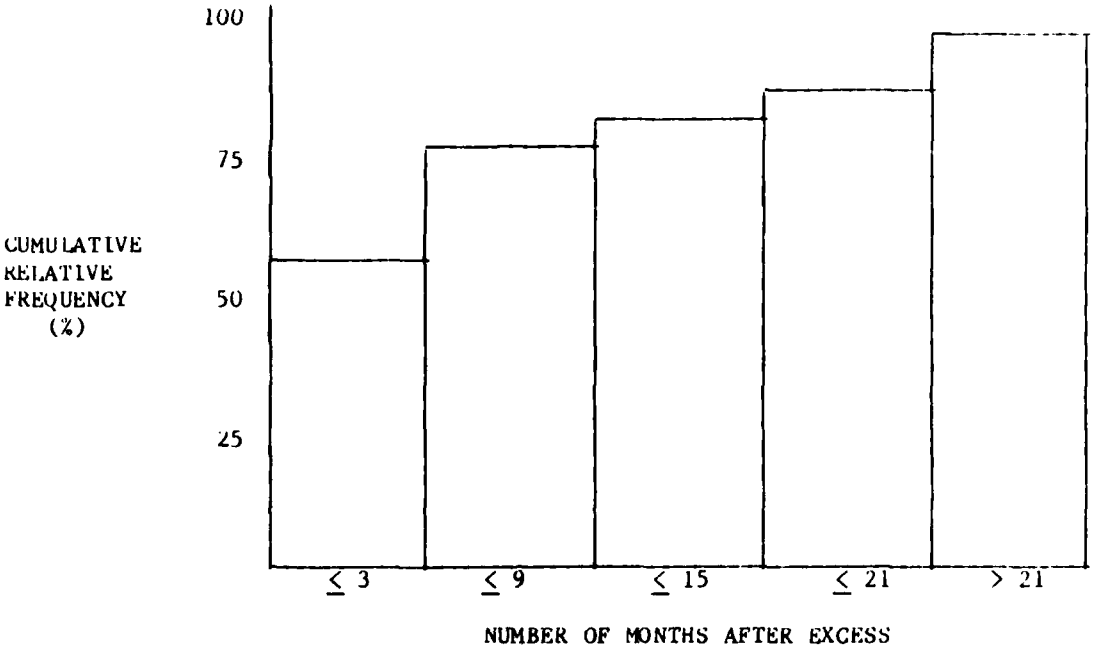


FIGURE B-5

The holding cost for all completely excess items was $134,000; order and purchase cost was $90,300. The cost trade-off analysis showed it was more economical to hold all the items declared complete excess for 1.5 years than to redistribute or ship them to disposal.

At Upper Heyford AB, we also found that two factors were statistically significant: number of previous demands and the mission impact code. Table B-3 shows the average number of previous demands for those items with subsequent demands and those without. The difference between the groups was statistically significant (99% confidence level).

AVERAGE DEMAND TWO YEARS PRIOR TO EXCESS

| | ITEMS WITH SUBSEQUENT DEMAND | ITEMS WITHOUT SUBSEQUENT DEMAND |
|---|---|---|
| Average number of demands | 1.8 | .9 |

TABLE B-3

Table B-4 shows the mission impact code for items in the two years prior to being declared excess. We compared the mission impact codes of those items with subsequent demand to those without.

MISSION IMPACT CODE FOR ITEMS WITH AND WITHOUT SUBSEQUENT DEMAND
(COMPLETE EXCESS)

| MISSION IMPACT CODE | NUMBER OF EXCESS ITEMS | NUMBER OF ITEMS WITH SUBSEQUENT DEMAND | NUMBER OF ITEMS WITHOUT SUBSEQUENT DEMAND |
|---|---|---|---|
| 1 | 3 | 3 | 0 |
| 2 | 9 | 2 | 7 |
| 3 | 2 | 2 | 0 |
| 4 | 2 | 0 | 2 |
| 5 | 169 | 31 | 138 |

TABLE B-4

Of those items with mission impact code 5 before being declared excess, 82% did not have subsequent demands.

Table B-5 shows the mission impact codes of those items without subsequent demands.

MISSION IMPACT CODE FOR ITEMS WITHOUT SUBSEQUENT DEMAND
(COMPLETE EXCESS)

| CODE | NUMBER | PERCENT |
|---|---|---|
| 1 | 0 | 0.0 |
| 2 | 7 | 4.8 |
| 3 | 0 | 0.0 |
| 4 | 2 | 1.3 |
| 5 | 138 | 93.9 |
| TOTAL | 147 | |

TABLE B-5

There were 147 items that did not have a demand subsequent to being declared excess. Of these 147 items, 138 were mission impact code 5 in the two years prior to being declared excess.

Table B-6 shows the number of previous demands for the 138 mission impact code 5 items. Over 62.0% percent of all the items (92/147) which did not have a later demand were items with a mission impact code 5 and zero demands in two years.

NUMBER OF PREVIOUS DEMANDS FOR ITEMS WITHOUT SUBSEQUENT DEMAND
(MISSION IMPACT CODE 5)
(COMPLETE EXCESS)

| ND | NUMBER | PERCENT |
|---|---|---|
| 0 | 92 | 66.7 |
| 1 | 18 | 13.0 |
| 2 | 7 | 5.1 |
| 3 | 16 | 11.6 |
| 4+ | 5 | 3.6 |
| TOTAL | 138 | |

TABLE B-6

Table B-7 shows the mission impact code for those items with a subsequent demand.

MISSION IMPACT CODE FOR ITEMS WITH SUBSEQUENT DEMAND
(COMPLETE EXCESS)

| CODE | NUMBER | PERCENT |
|---|---|---|
| 1 | 3 | 9.7 |
| 2 | 2 | 5.3 |
| 3 | 2 | 5.3 |
| 4 | 0 | 0.0 |
| 5 | 31 | 79.7 |
| TOTAL | 38 | |

TABLE B-7

There were 38 items that had subsequent demands. Of these, 31 were mission impact code 5.

In Table B-8, we show the number of demands for those 31 mission impact code 5 items. Only 15.8% of all the items (6/38) which had subsequent demands were items with mission impact code 5 and zero demands in two years.

NUMBER OF PREVIOUS DEMANDS FOR ITEMS WITH SUBSEQUENT DEMAND
(MISSION IMPACT CODE 5)
(COMPLETE EXCESS)

| ND | NUMBER | PERCENT |
|---|---|---|
| 0 | 6 | 19.4 |
| 1 | 12 | 38.7 |
| 2 | 9 | 29.0 |
| 3 | 3 | 9.7 |
| 4+ | 1 | 3.2 |
| TOTAL | 31 | |

TABLE B-8

To determine the operational impact, we looked at the mission impact code of the items at the next demand after being declared excess. The results for Upper Heyford AB are presented in Table B-9.

MISSION IMPACT CODE OF SUBSEQUENT DEMAND
(ALL EXCESS ITEMS)

| CODE | NUMBER OF ITEMS | PERCENT |
|---|---|---|
| 1 | 12 | 16.7 |
| 2 | 8 | 11.1 |
| 3 | 7 | 9.7 |
| 4 | 3 | 4.2 |
| 5 | 42 | 58.3 |

TABLE B-9

Over 16.7% were MICAP requests, 11.1% were "A" or awaiting parts requests. Thus 27.8% of the items had high priority demands after they had been declared excess.

# APPENDIX C

# STOCK FUND IMPACT

## APPENDIX C

## STOCK FUND IMPACT

This appendix identifies the data sources and calculations used to estimate the impact the increased retention period will have on the dollar value of inventory needed to support future requirements.

We extracted data from the USAF Supply Management Report. Because the majority of XF3 items fall under GSD, we looked at this category only. We averaged the dollar value of the Air Force requisitioning objective for reparables. The monthly average was $41.9 million. From our analyses of Randolph AFB and Upper Heyford AB, we found that excesses accounted for 23% of the total dollar value of XF3 items. Applying that percentage to the average, we estimate the Air Force will hold $9.6 million annually in inventory as a result of implementing these policy changes.

In our report on EOQ excesses [3], we were able to make a better estimate of the dollar amount of inventory to be held as a result of our policy changes. This was because XB3 excesses are accounted for separately in the USAF Supply Management Report. We could not estimate the dollar value of XF3 items in the same way because they are grouped under the category of reparables which includes depot reparables. This is, therefore, only an estimate of the amount of inventory to be held Air Force-wide as a result of implementing our changes.

## REFERENCES


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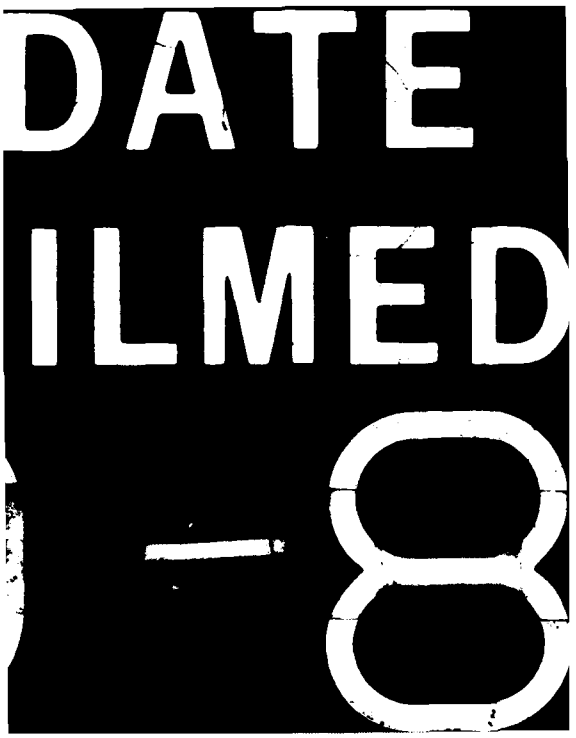
2. Blazer, Major Douglas J. "EOQ Item Mission Impact Analysis," AFLMC Report LS840714, October 1984.

3. Ham, Captain Martha P. "EOQ Excess Computation," AFLMC Report LS791005, December 1984.

4. HQ AF Inspection and Safety Center/IGBLS, Norton AFB, CA, Field Memorandum, Supply Retention and Excess Policy, 10 Feb 84.

5. HQ AF Inspection and Safety Center/IGBLS, Norton AFB, CA, Field Memorandum, Supply Retention and Excess Policy, 12 Mar 84.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